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ABSTRACT

This report covers a 12-month study and actual trial of a video distribution system for a primary school. It consisted of a main aerial distribution into a distribution junction box which also took video cassette recorders. The whole system was designed to distribute both in RF and video frequencies. Some ways of using the system have also been discussed, and the particular development has proven to be more flexible for the traditional RF distribution system. (Author)

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Television Distribution System for Primary Schools

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A report on the trial and installation of a Video Distribution System into Holden Hill North Primary School.

Educational Technology Centre. 1977
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ER005651

Television Distribution System for Primary Schools

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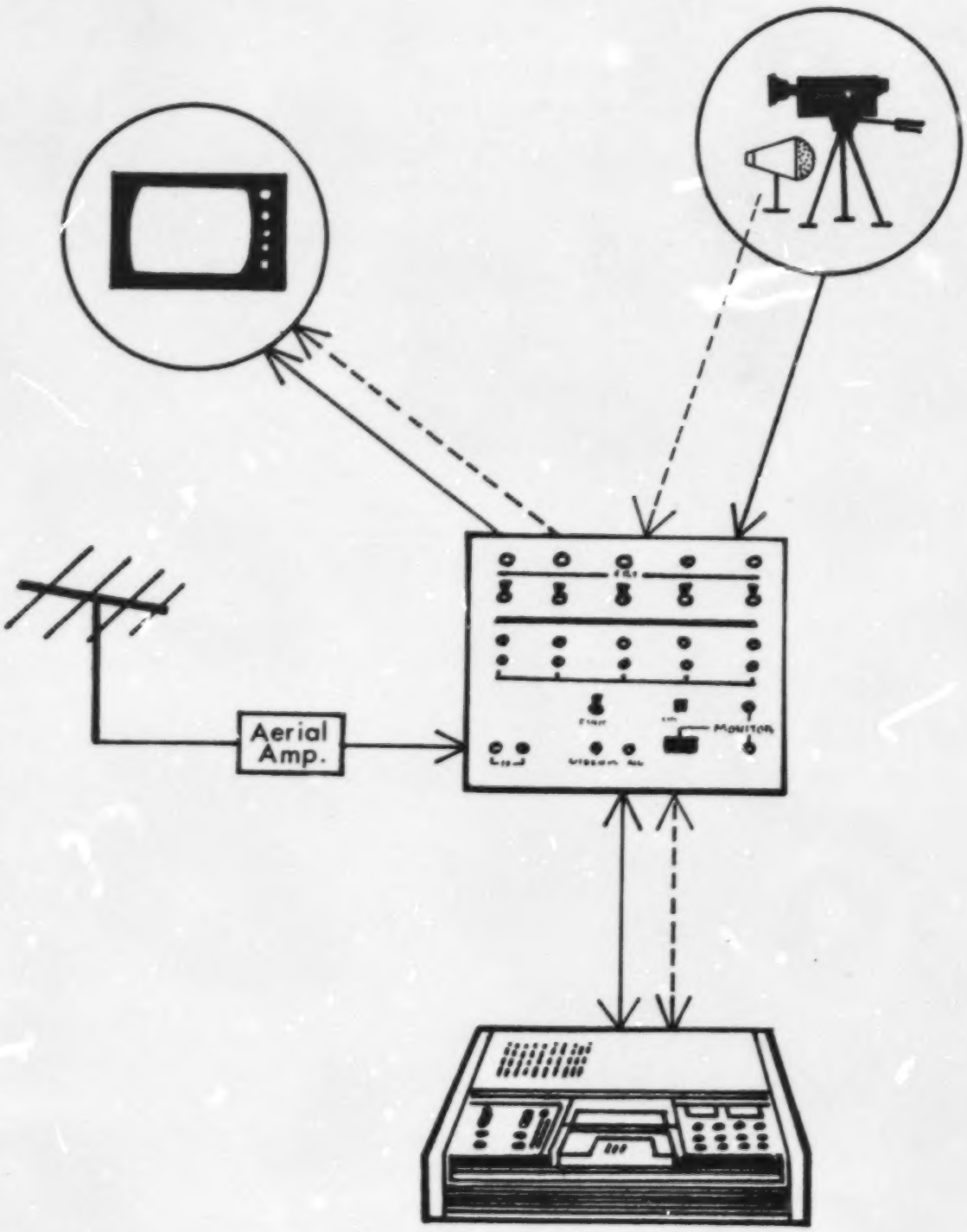
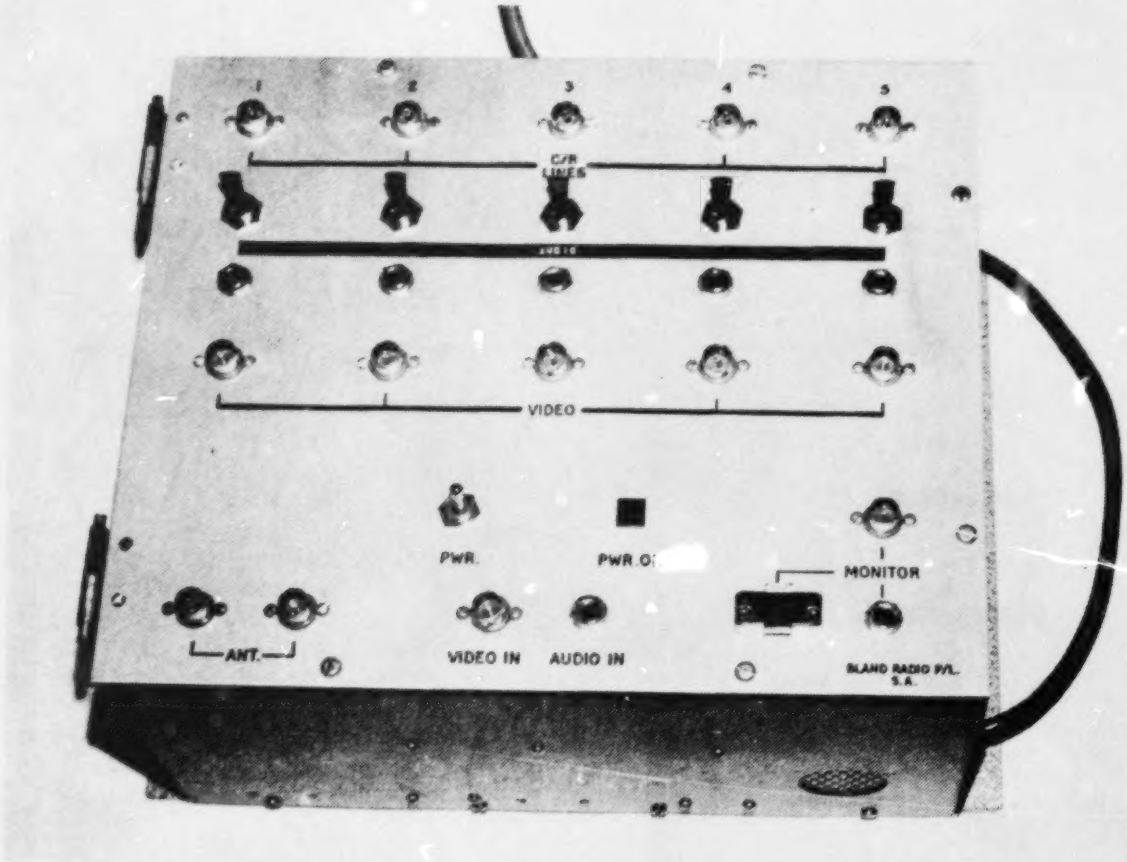
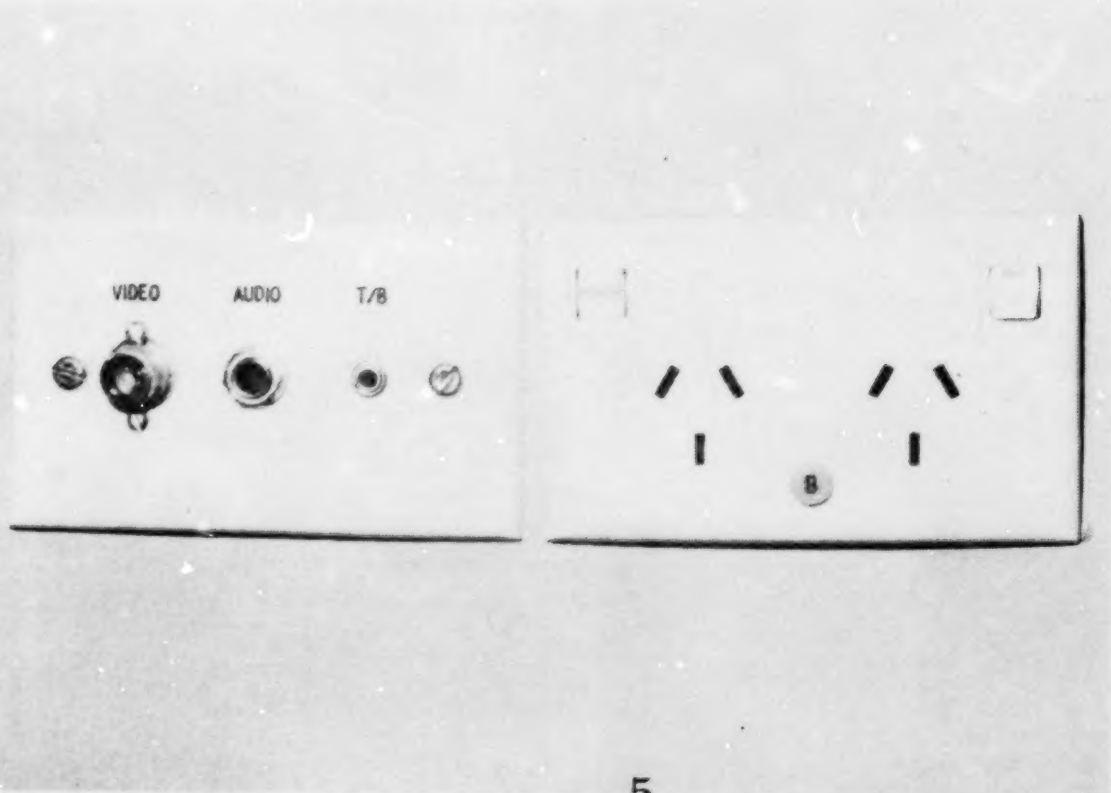
Symbolic diagram of Holden Hill North Video Distribution System



MAIN PANEL



CLASSROOM PANEL



2.

HOLDEN HILL NORTH VIDEO DISTRIBUTION SYSTEM

This was developed as an experimental installation to amplify and distribute direct audio and video signals from a video tape recorder or camera situation in a Primary School. The over-ruling objective of simplicity of equipment and operation was paramount. The whole system was based on a distribution of 'video' as opposed to 'RF' frequencies, the justification for which has been simply the high rate of 'problems' being experienced in previous RF systems.

Summarized List of Facilities Offered by this System

(1) Up to five video lines may be distributed from one video tape recorder input.

(2) Up to two off air signals at the same time as up to three from a video tape recorder may be distributed.

(3) More than one video tape recorder can be used by patching direct to C/R lines.

(4) Any two classrooms may be linked as transmission and reception stations. This is done by isolating so that video and audio can be received back from any C/R line and be patched elsewhere while other lines are normally engaged. This closed circuit facility has exciting possibilities in many areas of education, (see report on experiment at Holden Hill North, Appendix 3).

(5) Simultaneous off air signal at each outlet.

The Application of Video Distribution to Schools other than Holden Hill North

This system was designed to cater for schools without any existing video distribution and with only one video tape recorder. (Most schools in South Australia have only one video tape recorder or are yet to get one. Bearing the present monetary situation in mind this situation is not likely to change in the near future).

The school is assumed to have a video tape recorder and one or more television receivers.

Main Panel

A metal case approximately 30cm x 30cm x 20cm is fitted to the appropriate place in the resource centre. The body of the case contains the following components:

(a) An audio amplifier, fitted with a variable gain control and with the output split between the five classroom lines and the monitor line. The function of the device is to compensate for any loss of gain being caused by the splitting of the output line.
(b) A video amplifier with six outlets split to the five classroom lines and the monitor line.
(c) A power supply to both amplifiers.

The front panel, of anodized aluminium was fitted with the various outlets and appropriately engraved. Six screws secure the panel, which is hinged to allow access to interior components. Layout is shown in the accompanying photographs. These 'Box' Panels are designed as modules for five classroom lines (and may be linked if more are required).

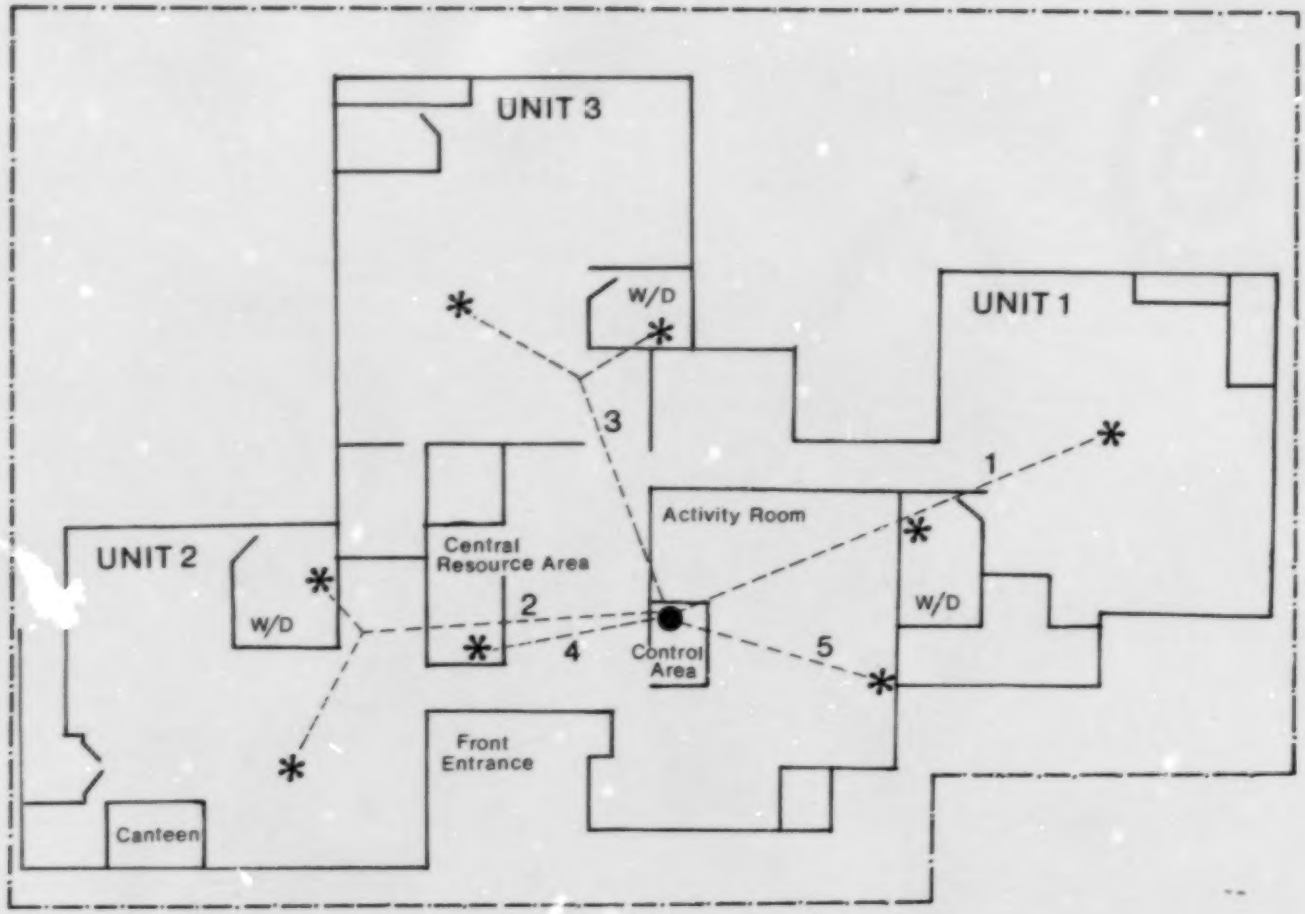
Classroom Panels

Plain white plastic plates measuring approximately 16cm x 10cm. Outlets fitted are for audio and video out and talk back. See photograph on Page 1.

Description of School Buildings

Holden Hill North School is a single level open space, modular construction, with a suspended type ceiling, typical of most recently constructed buildings of its type. The construction made the task of wiring easy, as access to all parts of the building can be made once entry is made to the ceiling/roof cavity. Modular walls

Holden Hill North Primary School



again make the task of connecting classroom panels simple. This point is vital as labour is a large factor in the cost of fitting wiring. The central position of the resource room also kept the length of wiring required to a minimum. (See diagram 1, school layout).

Wiring Installed

Coaxial cable for video and twin core wire for audio as well as cable for the talk back were laid simultaneously through the roof to five separate parts of the school. (See diagram 1). In three of the five lines, spur connections were made enabling the programme to be taken both in a central position or in a withdrawal room on the spur. (It was not considered that a set would be used on both points at the one time, although in practice this is possible).

DESCRIPTION OF COMPONENTS

Talk Back System

An Aiphone system of one master and two slave units (which are moved from point to point as required) was installed to allow for operator communication.

Video Tape Recorder

One J.V.C. CR 6000E U-Matic video cassette recorder was already available in the school.

Monitors

Three Healing Dalwood 20" Model 11605 black and white receiver/monitors.
Three J.V.C. 18" receiver/monitors, Model No. 7465 AU. These receivers were all available but required conversion for the new system.

Antenna System

Antenna input: normal external antenna connected via coaxial cable to an antenna amplifier which in turn was available to the main panel.

Operation of the Panels

(A) Video Tape Recorder to Classroom

It was decided in principle to operate this distribution system using a video signal, thereby necessitating a split of video and audio wiring. An eight-pin male Honda plug is attached to the female socket on the video tape recorder. The lead from this plug is split into two at the panel end, into a Belling-Lee plug for video and a 6.5mm phone plug for audio. These are connected to the video in and audio in sockets at the bottom/centre of the panel. The signals pass direct to the video and audio amplifiers where they are boosted.

The output from the video amplifier then goes to the video line. From here, it may be passed to any of the C/R (classroom lines) by a connecting patch cord. All five lines can receive at one time. The audio output passes to the row of five isolating switches, which in the closed position pass the audio signal direct to the selected classroom audio line. All five lines can receive at one time. At the classroom panel, a Belling-Lee plug attaches a coaxial lead to the 'video in' socket on the monitor. A 6.5mm phone plug similarly conducts the audio via a length of twin core cable to the audio input on the monitor. See diagram 2.

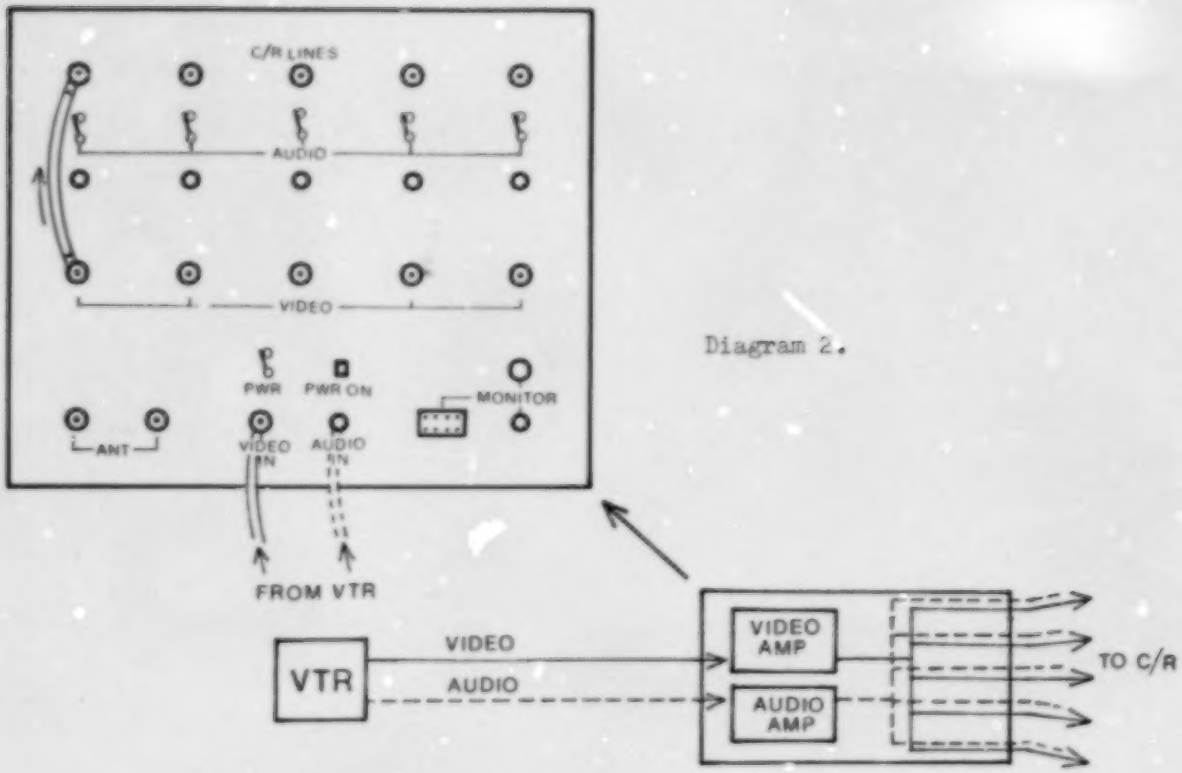


Diagram 2.

Video and audio signals can be sent direct to a classroom from the video tape recorder by:

(a) connecting to the V.T.R. an 8 pin plug which has the audio and video lines split. The video line is plugged into the selected classroom line on the panel, and the audio line to the appropriate classroom audio socket, which has been isolated by opening the switch. See diagram 3.

or (b) connecting the audio and video out sockets on the V.T.R. with the respective audio and video lines of the selected classroom, (the audio line being isolated).

The classroom panel is connected as previously described.

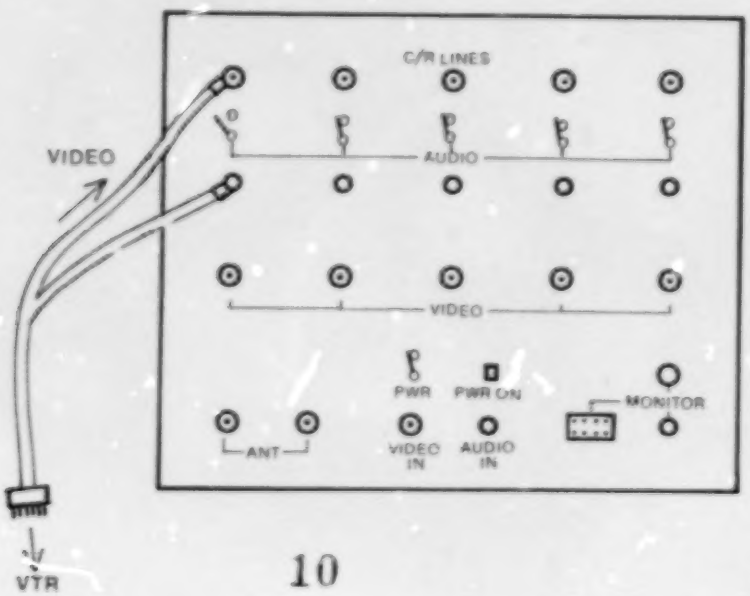


Diagram 3.

(B.1) Off Air to Classroom (C/R) Direct

The monitor selector switch is set to T.V. A coaxial cable is attached from the Belling-Lee antenna input on the set to the video socket on the wall panel. Only one connection is needed because the R.F. signal from the antenna is tuned by the receiver tuner as in a normal television set. See diagram 4.

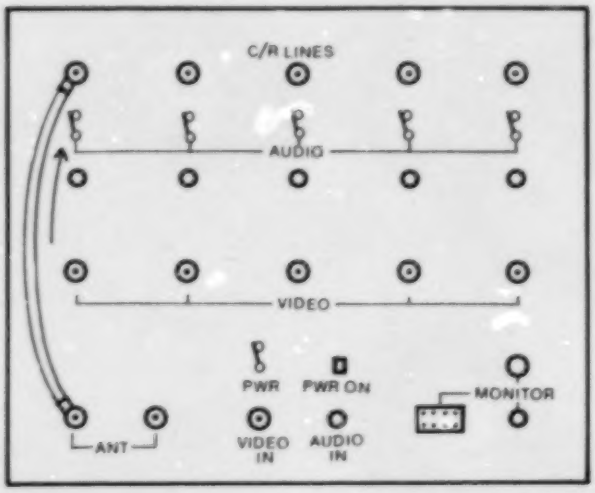


Diagram 4.

(B.2) Off Air to Classrooms via V.T.R.

If more than two classrooms wish to view a programme off air at the same time, it is possible to use the V.T.R. and monitor to provide 5 lines simultaneously. The V.T.R. and monitor are connected as for normal off air recording. The 'video out' and 'audio out' from the V.T.R. are then connected to the corresponding inputs on the distribution panel. The amplified signal may then be patched to the classroom lines, (as in diagram 5).

The exact operation of the V.T.R. will depend on the make of the machine, as the different circuitry of various makes determines whether or not the machine needs to be actually recording to pass the signal through the video out line. This operation then is left to the particular user bearing in mind that any V.T.R. with a 'video out' and 'audio out' facility will be able to perform this function.

The programme received at the classroom end will be a video signal and the set will have to be switched to the V.T.R. position.

This could be simplified if required (at more expense) by adding three antennae sockets to the existing 2 sockets and wiring accordingly.

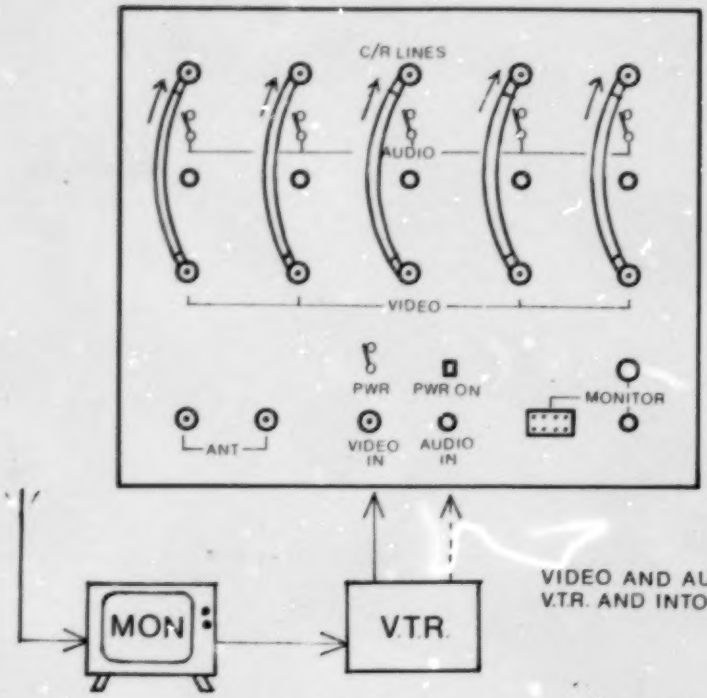


Diagram 5.

(B.3) Off Air to Classrooms from Monitor

It is possible to patch the video and audio signals direct from a monitor to the respective inputs to the main panel by using an 8 pin Honda plug appropriately wired, with a Belling-Lee plug on the video line and a 6.5mm phone plug on the audio line. (See diagram 6).

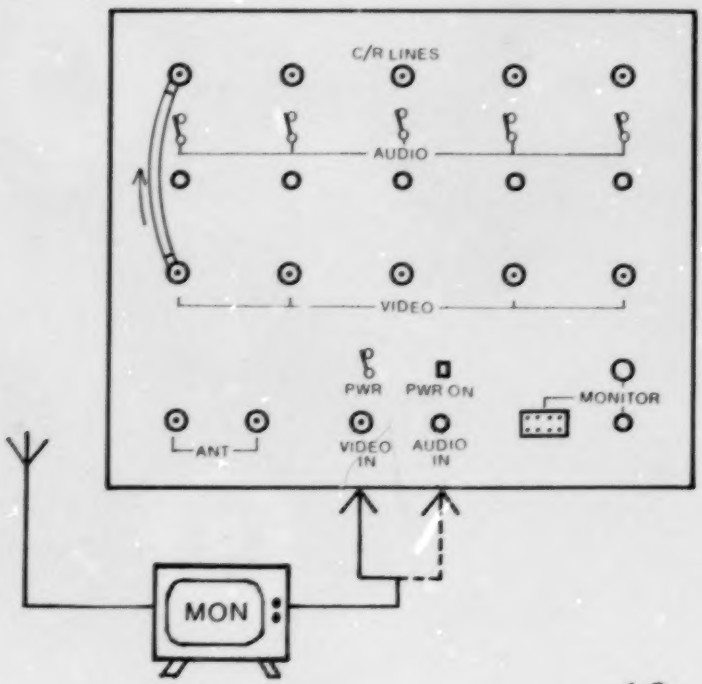


Diagram 6.

(C) Receiving Video Signal from C/R Lines

It is possible to send video signals from a video camera and audio signals from a microphone back to the main panel from the classrooms. Coaxial cable from the camera plugs into the Belling-Lee socket on the wall panel, and the audio signal, after being pre-amplified by an ordinary cassette recorder, is connected to the 6.5 phone socket. (Diagram 7).

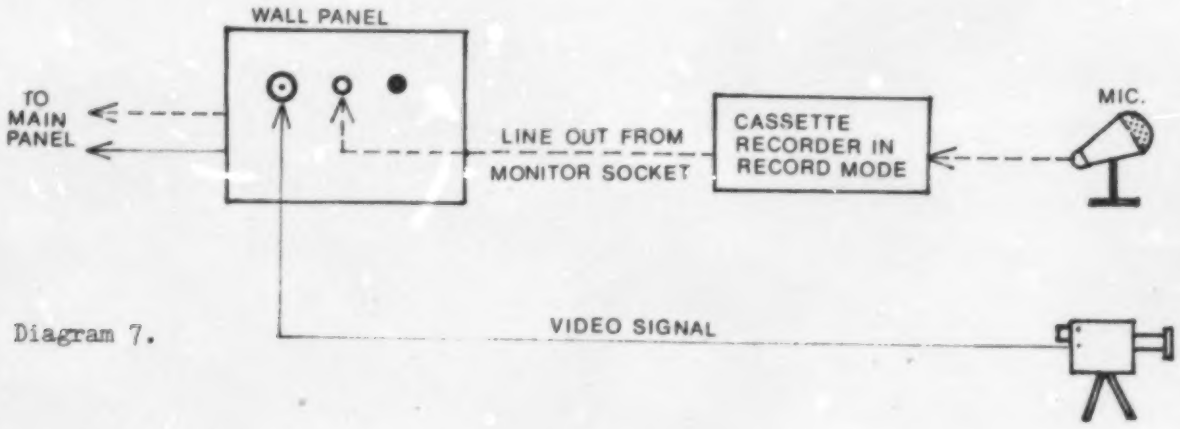


Diagram 7.

The panel signal can then be dealt with in the following ways:

(i) Patched to amplifier via Video In/Audio In if more than One Line is to be used

The incoming video signal from the classroom line is directly connected to the video input of the video amplifier using coaxial connecting lead. The isolator switch is turned down to isolate the audio line from the amplifier output. The audio input can then be patched to the input to the audio amplifier. The audio and video signals are then boosted and can be patched to one or more classrooms via the classroom lines, as for an ordinary programme.
See Diagram 8.

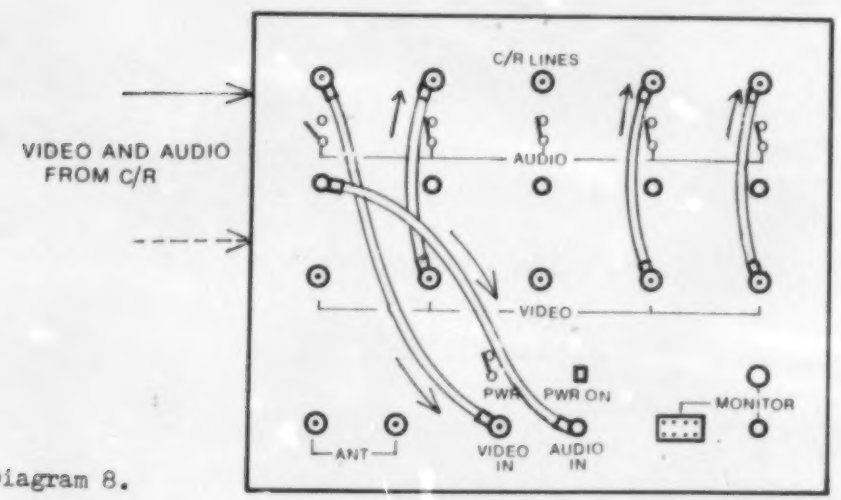


Diagram 8.

(ii) Patched direct to another classroom

The incoming video signal is patched directly from the camera line to the selected C/R line by coaxial connector. The audio isolator switches for both incoming audio line and selected classroom line are set in the down position to isolate the two lines. An audio connector then passes the signal directly across between the two.
(See diagram 9).

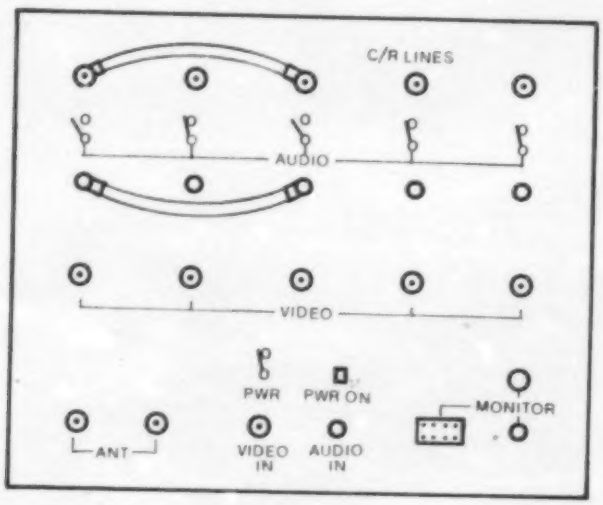
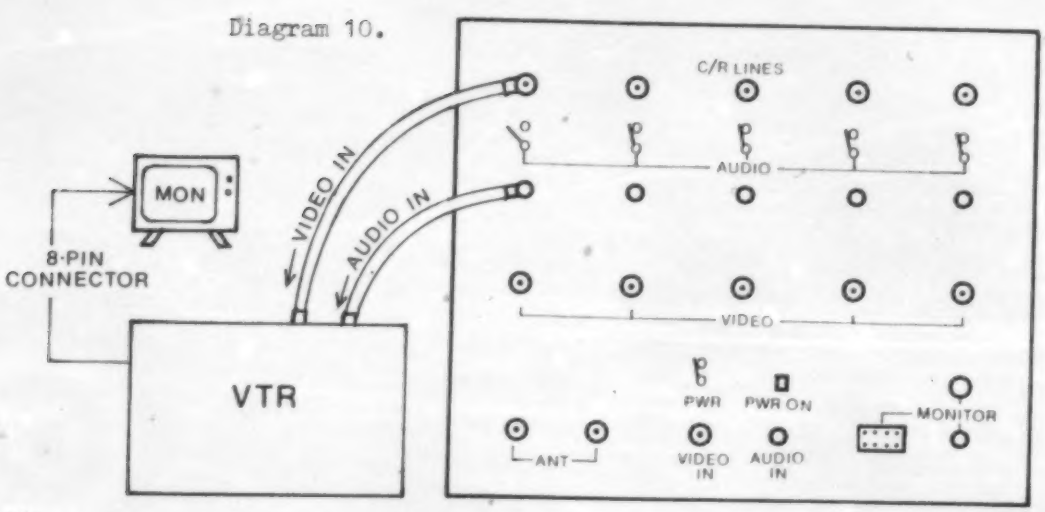


Diagram 9.

(iii) Patched to Video Tape Recorder

The video signal is connected with Belling-Lee connector and coaxial cable to the video in socket on the video tape recorder.
The audio signal is connected by twin core cable from the isolated line, (switch open), to the audio in socket on the video tape recorder.
(See diagram 10).

Diagram 10.



How Much Does This Cost? (with costing feasibility as at 1.8.77)

(1) Panels

The cost of the main panel, while at present fairly high, will drop considerably if the panels can be ordered and mass produced as a job lot of say 50 off. It is envisaged that a school could then have an additional panel installed if it wishes to enlarge the system to include additional classroom lines.

(2) Wiring

The principal cost of wiring lies in the labour involved. The coaxial cable itself costs about $140 per 300 metres, and so is relatively cheap. Labour costs range according to the construction of the school, and the layout of the buildings. The cheapest type would probably be the open space modular building, ranging through the various portable types to the older style solid buildings, with the multiple storey type being the most expensive to wire.

The price of labour costs varies from company to company, and so cannot be really tied down except by a definite quotation. However the task is highly labour intensive and if 'local' labour is available a lot of money can be saved.

(3) Adaption of Monitors

The system requires each set to be converted so as to have a separate video and audio line input as well as a Belling-Lee socket to accept an R.F. signal from an antenna.

Since schools have a variety of receivers, a problem arises in that the adaption of each is unique, because of different input requirements which must be balanced to the output of the distribution system.

G.E.C. converted two sets at Holden Hill North at a cost of $60 each. However, it is quite possible that a cheaper quote will be obtained from other companies or private electronic engineers if the job becomes repetitive.

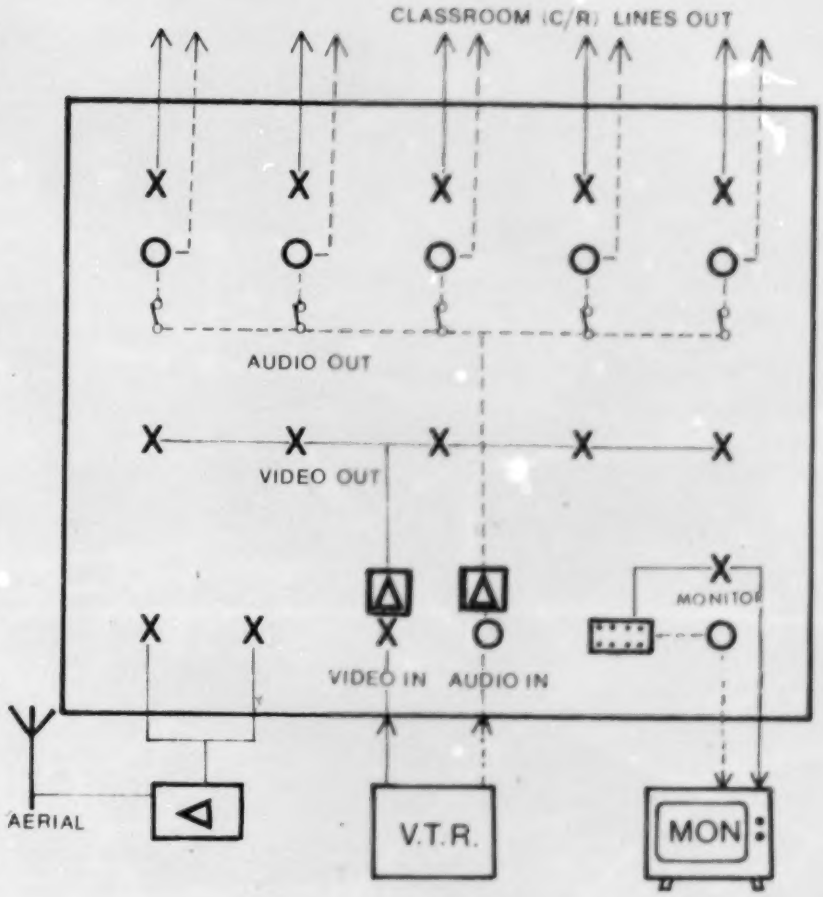
Costing as at 1.8.77

Wiring - Supply & Fitting	$ 496.00
Panels	$ 812.15
Installation	$ 151.32
Connecting Cables	$ 74.34
	$1534.21
Talk Back - Supply	$ 58.20
- Installation	$ 28.00
	$ 86.20
Above items by Bland Radio Pty. Ltd.	
Monitor Conversion (G.E.C.)	$ 120.00
Antenna & Amp. (Hills)	$ 50.00

APPENDIX 1

SCHEMATIC DIAGRAM OF PANELS

Video Panel



Classroom Panel

VIDEO LINES
AUDIO LINES
6·5mm PHONE SOCKET
BELLING LEE SOCKET
HONDA SOCKET
ISOLATING SWITCH
AMPLIFIER
3·5mm JACK SOCKET

APPENDIX 2

Classroom Video Link

Using the facilities of a video distribution system to conduct a simultaneous classroom lesson activity.

Holden Hill North Primary School is the first school in South Australia to be equipped with video distribution using pure video rather than an R.F. signal. This allows video and audio signals to pass to and from classrooms allowing each classroom to be its own T.V. Studio.

The school is an open space Samcon design divided into three units, an Upper Unit with years 5, 6, 7, a Middle Unit with years 3, 4 and a Lower Unit with years 1 and 2. The video link system was set up between the Upper Unit (broadcasting) and the Middle Unit (receiving).

The Upper Unit's lessons and activities were received by the Middle Unit in video and audio and the Middle Unit was able to transmit audio back.

The initial lesson was designed to stimulate interest on the theme 'Bubbles'. Children in both units were given the opportunity to make a wire bubble pipe and blow bubbles, observing their shape, colour and movement. The Upper Unit was then divided into groups and asked to write on card words describing the bubbles. These were then shown and read to the Middle Unit. While this activity was going on the Middle Unit was blackboarding words and comparing theirs to the Upper Unit. The Upper Unit then went on to do some dance movement and mime which was watched by the Middle Unit.

The Middle Unit joined in the dance movement and guessed at the mime activities.

The afternoon session took the form of an "Around the World Newscast" about giant bubbles invading the world. The Upper Unit's objective was to convince the Middle Unit that it was really happening. Activities that took place here involved group work in written and oral language and individual and group work in art.

After viewing the "Newscast" the children of the Middle Unit with their teacher's direction went on to write creative stories about Giant Bubbles from the stimulus given by the Upper Unit children.

The short stories were collated into book form and presented to the Upper Unit classes for their reading enjoyment.